Atmosphere Learning Progression
Grades 3-5: GLOBE Protocols Aligned with NASA Resources and NGSS Standards

NGSS Disciplinary Core Ideas Progression of Learning: Building on concepts developed in grades K-2 that focused on weather patterns, students in grades 3-5 will examine the relationship associated with how patterns of typical weather conditions over different time scales can be used to describe climate. NASA scientists use satellite data to analyze historical weather patterns to answer questions related to climate and typical weather patterns. By incorporating GLOBE and My NASA Data in the classroom educators provide students with the ability to collect data while connecting with NASA scientists and accessing satellite data to to answer their own questions related to atmospheric interactions that affect the weather and climate where they live.

Access this Progression online at the NASA Langley GLOBE Resource Page:www.globe.gov/web/nasa-langley-research-center/home/resources

Performance Expectations:
3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.
5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere and/or atmosphere interact.

NGSS Science Practices:	**NGSS Disciplinary Core Idea:**	**NGSS Crosscutting Concepts:**
Analyzing and Interpreting Data: Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. **Developing and Using Models:** Develop a model using an example to describe a scientific principle. **Obtaining, Evaluating and Communicating Information**: Obtain a combine information from books and other reliable media to explain phenomena.	**ESS2.D Weather and Climate:** Scientists record patterns of the weather across different times and areas so that they can make predictions about wh kind of weather might happen next. **ESS2.A Earth Materials and Systems:** Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans).	**Patterns:** Patterns of change can be used to make predictions. **Systems and System Models:** A system can be described in terms of its components and their interactions.

GLOBE Alignment: Environmental observations, data collection and learning activities to develop Earth science concepts.

Atmosphere Protocols:	**GLOBE Learning Activities:** (Learning activities can be used to develop concepts associated with the NGSS Performance Expectations.)	**Guiding Question(s):**
Air Temperature Clouds Surface Temperature Precipitation **Data Investigation Sheets:** Atmosphere Investigation Integrated 1-Day Atmosphere Investigation Clouds 1-Day Atmosphere Investigation Surface Temperature **Elementary GLOBE Book:** Do You Know That Clouds Have Names? What's Up in the Atmosphere? Exploring Colors in the Sky What in the World is Happening to Our Climate?	1. Observing, Describing and Identifying Clouds (3-ESS2-1) 2. Estimating Cloud Cover (3-ESS2-1) 3. Cloud Watch (3-ESS2-1) 4. Cloudscape (3-ESS2-1) 5. Land, Water, and Air (5-ESS2-1) 6. Making a Climograph (3-ESS2-2) 7. C1: From Weather to Climate-Looking at Air Temperature Data (3-ESS2-1, 3-ESS2-2) 8. What Can We Learn About Our Seasons? (3-ESS2-1, 3-ESS2-2) 9. Sky Observers (3-ESS2-1)	1. How is weather related to the seasons? 2. What type of weather is associated with the different seasons in the region where you live? How does this compare to climates in other regions around the world? 3. Describe the interactions of matter and energy occurring between the atmosphere and geosphere. Atmosphere and biosphere? Atmosphere and hydrosphere?

NASA Resource: Data and lessons drawn from NASA's Earth science research program

NASA Learning Activities:	**My NASA DATA Live Access Server Data Visualization Tool:** **Earth System Data Explorer**:	**My NASA Data Lessons:**
NASA Climate Change Educational Modules NASA's Climate Kids NASA Wavelength 3-5 Learning Activities List	**My NASA Data Variable Suggestions:** **Air Temperature:** Monthly Near-Surface Air Temperature (ISCCP) **Clouds:** Monthly Cloud Coverage (CERES TERRA) **Surface Temperature**: Monthly Surface Skin Temperature (CERES) **Precipitation**: Monthly Precipitation (GPCP)	Observing Solar Energy (3-ESS2-1, 3-ESS2-2) Observing Earth's Seasonal Changes (3-ESS2-1, 3-ESS2-2, 5-ESS2-1)

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